

**Engineering Evaluation
Andronico's Community Markets
Application No. 28064
Plant No. 23618
690 Fremont Avenue, Los Altos, CA 94024**

BACKGROUND

Andronico's Community Markets has applied for an Authority to Construct (AC) and/or a Permit to Operate (PO) for the following equipment:

- S-1 Emergency Standby Generator Set: Natural Gas Engine
Cummins, Model: WSG-1068, Model Year: 2016
132 BHP, 1.11 MMBtu/hr
Abated by**
- A-1 Cummins 3-way Non-Selective Catalytic Reduction Device**

The NG powered emergency standby generator set (S-1) will provide emergency standby power in the event of a disruption to power service.

The engine is subject to attached condition no. **23107**.

EMISSIONS CALCULATIONS

The emission factors used to estimate NO_x, POC and CO emissions from the NG engine generator set described above are provided by the engine manufacturer. PM₁₀ and SO₂ emission factors are based on AP 42, Fifth Edition, Volume I, Chapter 3: Stationary Internal Combustion Sources; Section 2.4.1 Control Techniques for 4-Cycle Rich-burn Engines.¹ Total Hydrocarbon emission rates were assumed to be equal to Precursor Organic Compound (POC) emission rates NSCR Default Abatement factors will be used: NO_x:85%, CO: 80%, POC:50%*.

The engine will operate during emergency use and for a maximum of 50 hours per year for maintenance and testing. See Table 1.

Table 1-Estimated Emissions From S-1

Pollutant	Emission Factor (g/BHP-hr)	Emission (lb/hr)	Emission (lb/yr)	Emission (TPY)	Maximum Daily Emissions (lb/day)
NO _x *	2.000	0.579	28.952	0.015	13.897
POC*	1.000	0.290	14.476	0.007	6.949
CO*	4.000	1.158	57.904	0.029	27.794
PM ₁₀	0.036	0.011	0.528	0.000	0.254
SO ₂	0.002	0.001	0.033	0.000	0.016

Basis:

86 hp Max Rated Output

671 cf/hr Max fuel use Rate = 0.68 MMBTU/hr

NO_x, HC, CO and NO_x+HC emission factors are from Manufacturer's Emission Data

The PM and SO₂ emission factors are from EPA AP-42, Table 3.2-3 for 4 stroke Rich-burn Engines

Annual Emissions are based on the Annual Limit (50 hr/yr) of operation for testing and maintenance

Max daily emissions are based on 24 hr/day since no daily limits are imposed on emergency operations

* Default abatement reductions used are from BAAQMD Engineering Division, Engine Training Manual, Page 7, August 2012

¹ SO₂ Emission Factor = 5.88 E-04 Lb./MMBTu; calculations assume 100% of fuel sulfur conversion with the content in natural gas = 2000 gr/10⁶scf. PM₁₀ Fuel input Emission Factor = 9.95E-03 Lb./MMBTu; aerodynamic particle diameter =< 1 μm, for the purposes of filterable emissions PM₁₀= PM_{2.5}. These emissions are expected to be negligible, but included for completeness.

TOXIC RISK SCREENING ANALYSIS

The emission factors used to estimate Hazardous Air Pollutants (HAPs) emissions from the engine described above are from: AP-42 for natural gas fired 4-cycle rich burn engine Table 3.2-3, or the California Air Toxics Emission Factor Database (maintained by the California Air Resources Board) for natural gas fired 4-cycle rich burn engines with less than 650 hp. The CATEF Emission Factors maintained by the ARB were used to estimate emissions for all compounds that have AP-42 emission factors and CATEF emission factors.

The HAP emission estimates are based on uncontrolled emission factors for natural gas engines and an assumed abatement efficiency of 50% removal of organic HAP compounds, except for the pollutants which have abated emission factors in CATEF. The abatement efficiency is based on the fact that the engine is being permitted with a Catalytic Converter and an air fuel ratio controller.

As shown in Table 2 and Table 3 below, no toxic air contaminants exceed the District Risk Screening Triggers and a Risk Screening Analysis is not required.

**Table 2
HAP EMISSIONS ESTIMATES BASED ON AP-42 TABLE 3.2-3 (FOR COMPOUNDS WITH NO CATEF E.F.)**

Compound	E.F.	Unit	Assumed Abatement Efficiency %	Abated Emissions (lb/hr)	Acute Trigger Level (lb/hr)	HRSA Triggered? (Y/N)	Abated Emissions (lb/yr)	Chronic Trigger Level (lb/yr)	HRSA Triggered? (Y/N)	
1,1,2,2-Tetrachloroethane	2.53E-05	lb/MMBtu	50	1.41E-05	None	NO	7.04E-04	1.90E+00	NO	
1,1,2-Trichloroethane	<	1.53E-05	lb/MMBtu	50	8.51E-06	None	NO	4.25E-04	6.60E+00	NO
1,1-Dichloroethane	<	1.13E-05	lb/MMBtu	50	6.28E-06	None	NO	3.14E-04	6.60E+01	NO
1,2-Dichloroethane	<	1.13E-05	lb/MMBtu	50	6.28E-06	None	NO	3.14E-04	None	NO
1,2-Dichloropropane	<	1.30E-05	lb/MMBtu	50	7.23E-06	None	NO	3.61E-04	None	NO
1,3-Butadiene		6.63E-04	lb/MMBtu	50	CATEF	None	NO	CATEF	1.10E+00	NO
1,3-Dichloropropene	<	1.27E-05	lb/MMBtu	50	7.06E-06	None	NO	3.53E-04	None	NO
Acetaldehyde		2.79E-03	lb/MMBtu	50	CATEF	1.00E+00	NO	CATEF	3.80E+01	NO
Acrolein		2.63E-03	lb/MMBtu	50	CATEF	5.5E-03	NO	CATEF	1.40E+01	NO
Benzene		1.58E-03	lb/MMBtu	50	CATEF	2.9E+00	NO	CATEF	3.80E+00	NO
Butyr/isobutyraldehyde		4.86E-05	lb/MMBtu	50	2.70E-05	None	NO	1.35E-03	None	NO
Carbon Tetrachloride	<	1.77E-05	lb/MMBtu	50	9.84E-06	4.2E+00	NO	4.92E-04	2.50E+00	NO
Chlorobenzene	<	1.29E-05	lb/MMBtu	50	7.17E-06	None	NO	3.59E-04	3.90E+04	NO
Chloroform	<	1.37E-05	lb/MMBtu	50	7.62E-06	3.3E-01	NO	3.81E-04	2.00E+01	NO
Ethylbenzene	<	2.48E-05	lb/MMBtu	50	CATEF	None	NO	CATEF	4.30E+01	NO
Ethylene Dibromide	<	2.13E-05	lb/MMBtu	50	1.18E-05	None	NO	5.92E-04	1.50E+00	NO
Formaldehyde		2.05E-02	lb/MMBtu	50	CATEF	1.2E-01	NO	CATEF	1.80E+01	NO
Methanol		3.06E-03	lb/MMBtu	50	1.70E-03	6.2E+01	NO	8.51E-02	1.50E+05	NO
Methylene Chloride		4.12E-05	lb/MMBtu	50	2.29E-05	3.1E+01	NO	1.15E-03	1.10E+02	NO
Naphthalene	<	9.71E-05	lb/MMBtu	50	CATEF	None	NO	CATEF	3.20E+00	NO
PAH		1.41E-04	lb/MMBtu	50	CATEF	None	NO	CATEF	None	NO
Styrene	<	1.19E-05	lb/MMBtu	50	6.62E-06	4.6E+01	NO	3.31E-04	3.50E+04	NO
Toluene		5.58E-04	lb/MMBtu	50	3.10E-04	8.2E+01	NO	1.55E-02	1.20E+04	NO
Vinyl Chloride	<	7.18E-06	lb/MMBtu	50	3.99E-06	4.0E+02	NO	2.00E-04	1.40E+00	NO
Xylene		1.95E-04	lb/MMBtu	50	1.08E-04	4.9E+01	NO	5.42E-03	2.70E+04	NO

Table 3
HAP EMISSION ESTIMATES BASED ON CATEF EMISSION FACTORS

SUBSTANCE	E.F. MEAN	UNIT	Assumed Abatement Efficiency %	Abated Emissions (lb/hr)	Acute Trigger Level (lb/hr)	HRSA Triggered? (Y/N)	Abated Emissions (lb/yr)	Chronic Trigger Level (lb/yr)	HRSA Triggered? (Y/N)
1,3-Butadiene	1.04E-01	lbs/MMcf	50	5.67E-05	None	NO	0.0028352	6.30E-01	NO
Acenaphthene	1.94E-03	lbs/MMcf	50	1.06E-06	None	NO	5.289E-05	None	NO
Acenaphthylene	1.45E-02	lbs/MMcf	50	7.91E-06	None	NO	0.0003953	None	NO
Acetaldehyde	8.83E-01	lbs/MMcf	50	4.81E-04	None	NO	0.0240721	3.80E+01	NO
Acrolein	5.47E-01	lbs/MMcf	50	2.98E-04	5.50E-03	NO	0.0149122	1.40E+01	NO
Anthracene	1.84E-03	lbs/MMcf	50	1.00E-06	None	NO	5.016E-05	None	NO
Benzene	1.38E-01	lbs/MMcf	0	2.08E-03	2.90E+00	NO	0.1041399	3.80E+00	NO
Benzo(a)anthracene	3.39E-04	lbs/MMcf	50	1.85E-07	None	NO	9.242E-06	None	NO
Benzo(a)pyrene	1.15E-04	lbs/MMcf	50	6.27E-08	None	NO	3.135E-06	None	NO
Benzo(b)fluoranthene	2.37E-04	lbs/MMcf	50	1.29E-07	None	NO	6.461E-06	None	NO
Benzo(g,h,i)perylene	1.95E-04	lbs/MMcf	50	1.06E-07	None	NO	5.316E-06	None	NO
Benzo(k)fluoranthene	1.03E-04	lbs/MMcf	50	5.62E-08	None	NO	2.808E-06	None	NO
Chrysene	3.10E-04	lbs/MMcf	50	1.69E-07	None	NO	8.451E-06	None	NO
Dibenz(a,h)anthracene	1.25E-05	lbs/MMcf	50	6.82E-09	None	NO	3.408E-07	None	NO
Ethylbenzene	1.16E-02	lbs/MMcf	50	6.32E-06	None	NO	0.0003162	4.30E+01	NO
Fluoranthene	9.95E-04	lbs/MMcf	50	5.43E-07	None	NO	2.713E-05	None	NO
Fluorene	6.91E-03	lbs/MMcf	50	3.77E-06	None	NO	0.0001884	None	NO
Formaldehyde	4.99E-02	lbs/MMcf	0	2.56E-03	2.1E-01	NO	0.1281303	1.80E+01	NO
Indeno(1,2,3-cd)pyrene	1.69E-04	lbs/MMcf	50	9.21E-08	None	NO	4.607E-06	None	NO
Naphthalene	7.65E-02	lbs/MMcf	50	4.17E-05	None	NO	0.0020855	3.20E+00	NO
Phenanthrene	7.07E-03	lbs/MMcf	50	3.85E-06	None	NO	0.0001927	None	NO
Propylene	1.60E+01	lbs/MMcf	50	8.72E-03	None	NO	0.4361881	1.20E+05	NO
Pyrene	1.79E-03	lbs/MMcf	50	9.76E-07	None	NO	4.88E-05	None	NO
Toluene	1.07E+00	lbs/MMcf	50	5.83E-04	8.2E+01	NO	0.0291701	1.20E+04	NO
Xylene (m,p)	4.41E-01	lbs/MMcf	50	2.40E-04	4.9E+01	NO	0.0120224	2.70E+04	NO
Xylene (o)	2.17E-01	lbs/MMcf	50	1.18E-04	4.9E+01	NO	0.0059158	2.70E+04	NO
Xylene (Total)	6.02E-02	lbs/MMcf	50	3.28E-05	4.9E+01	NO	0.0016412	2.70E+04	NO
PAH Equivalentents as Benzo(a)pyrene	1.70E-06	lbs/MMcf	50	3.21E-09	50	NO	1.606E-07	2.70E+04	NO

PLANT CUMULATIVE EMISSIONS

Table 4 summarizes the cumulative increase in criteria pollutant emissions that will result from the operation of S-1.

Table 4
Plant Cumulative Increase: (tons/year)

Pollutant	Existing	New	Total
POC	0.000	0.007	0.007
NOx	0.000	0.014	0.014
CO	0.000	0.029	0.029
PM ₁₀	0.000	0.000	0.000

BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

In accordance with Regulation 2-2-301, BACT is triggered for any new or modified source with the potential to emit 10 pounds or more per highest day of POC, NPOC, NO_x, CO, SO₂ or PM₁₀.

Based on the emission calculations above, BACT is triggered for NO_x & CO since the maximum daily emissions of each exceed 10 lb/day.

Source Category

Source:	<i>IC Engine – Spark Ignition, Natural Gas Fired Emergency Engine</i>	Revision:	<i>1</i>
		Document #:	<i>96.3.4</i>
Class:	<i>>= 50 HP</i>	Date:	<i>5/7/03</i>

Determination

POLLUTANT	BACT		TYPICAL TECHNOLOGY
	1. Technologically Feasible/ Cost Effective	2. Achieved in Practice	
POC	1. <i>n/d</i> 2. <i>1.0 g/bhp-hr^a</i>		1. <i>n/d</i> 2. <i>lean burn technology^a</i>
NO_x	1. <i>n/d</i> 2. <i>1.0 g/bhp-hr^a</i>		1. <i>n/d</i> 2. <i>lean burn technology^a</i>
SO₂	1. <i>n/a</i> 2. <i>n/s</i>		1. <i>n/a</i> 2. <i>natural gas^a</i>
CO	1. <i>n/d</i> 2. <i>2.75 g/bhp-hr^a</i>		1. <i>n/d</i> 2. <i>lean burn technology^a</i>
PM₁₀	1. <i>n/d</i> 2. <i>n/s</i>		1. <i>n/d</i> 2. <i>natural gas^a</i>
NPOC	1. <i>n/a</i> 2. <i>n/a</i>		1. <i>n/a</i> 2. <i>n/a</i>

References

a. 1993 BACT 2 levels for IC Engine-Spark Ignition, Nat. Gas >_ 250 HP (3/19/93) without the need for post-combustion controls (not considered to be cost effective for emergency only applications).

BACT(2) requires the NO_x emission to be less than 1.000 g/hp-hr, and S-1 does not comply with BACT standard since the NO_x emissions from S-1 is 2.000 g/hp-hr. BACT(2) requires the CO emission to be less than 2.75g/hp-hr, and S-1 does not comply with BACT standard since the CO emissions from S-1 is 4.000 g/hp-hr. However, since the engine is less than 250 HP and since the engine is already abated with a 3-way Non-selective catalytic reduction abatement device, it is not considered cost effective to require further abatement.

OFFSETS

Per Regulation 2-2-302, offsets must be provided for any new or modified source at a facility that emits more than 10 tons/yr of POC or NO_x. Based on the emission calculations above, offsets are not required for this application.

STATEMENT OF COMPLIANCE

The owner/operator of S-1 shall comply with Regulation 6, Rule 1 (*Particulate Matter – General Requirements*) and Regulation 9-1-301 (*Inorganic Gaseous Pollutants: Sulfur Dioxide for Limitations on Ground Level Concentrations*). From Regulation 9-1-301, the ground level concentrations of SO₂ will not exceed 0.5 ppm continuously for 3 consecutive minutes or 0.25 ppm averaged over 60 consecutive minutes, or 0.05 ppm averaged over 24 hours.

S-1 is an emergency standby generator; from Regulation 9, Rule 8 (*NO_x and CO from Stationary Internal Combustion Engines*), Section 110.5 (*Emergency Standby Engines*), S-1 is exempt from the requirements of Regulations 9-8-301 (*Emission Limits on Fossil Derived Fuel Gas*), 9-8-302 (*Emission Limits on Waste Derived Fuel Gas*), 9-8-303 (*Emissions Limits – Delayed Compliance, Existing Spark-Ignited Engines, 51 to 250 bhp or Model Year 1996 or Later*), 9-8-304 (*Emission Limits – Compression-Ignited Engines*), 9-8-305 (*Emission Limits – Delayed Compliance, Existing Compression-Ignited Engines, Model Year 1996 or Later*), 9-8-501 (*Initial Demonstration of Compliance*) and 9-8-503 (*Quarterly Demonstration of Compliance*).

Allowable operating hours and the corresponding record keeping in Regulations 9-8-330 (*Emergency Standby Engines, Hours of Operation*) and 530 (*Emergency Standby Engines, Monitoring and Recordkeeping*) will be included in the Permit Conditions below.

California Environmental Quality Act (CEQA)

This application is considered to be ministerial under the District's Regulation 2-1-311 and therefore is not subject to CEQA review. The engineering review for this project requires only the application of standard permit conditions and standard emission factors in accordance with Permit Handbook Chapter 2.3.

Public Notification, Schools

This facility is within 1,000 feet from the nearest school and therefore is subject to the public notification requirements of Regulation 2-1-412. The Loyola Elementary School property line that is approximately 940 ft. from the source (S-1). Additionally, the Los Altos Christian School property line is approximately 1094 ft. and because the radius increases from 1000 ft. to 1320 ft. (1/4 of a mile) when a school is found to be within 1000 ft., it will also be included in the Notice.

Prevention of Significant Deterioration (PSD)

PSD is not triggered.

PERMIT CONDITIONS

COND# 23107 -----

1. The owner or operator shall operate the stationary emergency standby engine, only to mitigate emergency conditions or for reliability-related activities (maintenance and testing). Operating while mitigating emergency conditions and while emission testing to show compliance with this part is unlimited. Operating for reliability-related activities are limited to 50 hours per year.
[Basis: Emergency Standby Engines, Hours of Operation Regulation 9-8-330]
2. The Owner/Operator shall equip the emergency standby engine(s) with: a non-resettable totalizing meter that measures hours of operation or fuel usage
[Basis: Emergency Standby Engines, Monitoring and Record keeping 9-8-530]
3. The Owner/Operator shall not operate unless natural gas fired engine is abated with a Catalytic Converter/Silencer unit.
[Basis: Cumulative Increase]

4. Records: The Owner/Operator shall maintain the following monthly records in a District- approved log for at least 24 months from the date of entry. Log entries shall be retained on-site, either at a central location or at the engine's location, and made immediately available to the District staff upon request.
- a. Hours of operation (maintenance and testing).
 - b. Hours of operation for emission testing.
 - c. Hours of operation (emergency).
 - d. For each emergency, the nature of the emergency condition.
 - e. Fuel usage for engine.
 - f. CARB Certification Executive Order for the engine.
- [Basis: Emergency Standby Engines, Monitoring and Recordkeeping 9-8-530]

RECOMMENDATION

The District has reviewed the material contained in the permit application for the proposed project and has made a preliminary determination that the project is expected to comply with all applicable requirements of District, state, and federal air quality-related regulations. The preliminary recommendation is to issue an Authority to Construct for the equipment listed below. However, the proposed source will be located within 1000 feet of a school, which triggers the public notification requirements of District Regulation 2-1-412. After the comments are received and reviewed, the District will make a final determination on the permit.

I recommend that the District initiate a public notice and consider any comments received prior to taking any final action on issuance of an Authority to Construct to Andronico's Community Markets for the following source:

- S-1 Emergency Standby Generator Set: Natural Gas Engine
 Cummins, Model: WSG-1068, Model Year: 2016
 132 BHP, 1.11 MMBtu/hr
 Abated by**
- A-1 Cummins 3-way Non-Selective Catalytic Reduction Device**

By: _____

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 Engineering Division